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Supporting student learning: Curriculum redesign of *General Pharmacy* in Xi'an Jiaotong University

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Abstract

This paper gives a general view of the curriculum design and teaching strategies for the course *General Pharmacy* in Xi'an Jiaotong University. Based on the theory that learning is an active process in which the learner must be involved, a curriculum redesign to encourage student-centred learning is suggested, future challenges for such changes are estimated.

Introduction

The author participated in the collaborative project 'Teaching Science in English: a professional development course for Chinese university science teachers' between the University of Sydney and the China Scholarship Council. This program introduced bilingual teaching and teaching strategies in science subjects.

With the many changes in the world today, pharmacy is taken by more and more students. The curriculum design and teaching strategies for the course *General Pharmacy* in our university was not sufficiently meeting the needs of the students and this led to a change in the course, related to modern education theory.

Pharmacy as a discipline includes modern medicine and traditional medicine, and is a fast growing area in China. The number of people requiring health care services has steadily increased, and this trend is likely to continue. A greater emphasis on the training of pharmacy graduates is becoming a vital part of a complete health care system. The principal goal of pharmaceutical care is to achieve positive outcomes from the use of medication that improves patients' quality of life. So this field is related to everyone's life. With the development of public health awareness and the changes in economic status, people are paying more attention to the quality of life, including health. There is a need to educate the general public about aspects of health care. In addition, many people working in fields other than pharmacy, for example businessmen, lawyers, chemists and biologists, now need to have a general understanding of pharmacy. It has become necessary to design a special pharmacy curriculum for undergraduates who are not pharmacy students. However, the course design concentrated on the content of pharmacy but with little reference to the characteristics of these students.

Overview – *General Pharmacy*

In Xi'an Jiaotong University, *General Pharmacy* is an elective course available for any undergraduates although students in pharmacy and medical school students can take special pharmacy subjects in their own school. *General Pharmacy* is taken by students in Science, Arts, Business, Economics, Law and Engineering. These students are either in first, second, third or final year of their degree program. They can take the curriculum in any semester depending on their own schedule. This results in large classes of more than 200 students, and with a very heterogeneous background.

Course content

General Pharmacy is an integration of the knowledge of both traditional and modern medicine. It covers a basic introduction of five areas: pharmacology, medicament, phytochemistry, pharmacognosy and medicine analysis. Pharmacology is the study of the action and uses of drugs. Medicament is very important for it deals with the

effects of the dosage on the therapeutic activity of a medication. Medicament studies also include technique pharmacy and dispensing pharmacy. Phytochemistry is related to the application of basic organic and inorganic chemistry to medicines. Pharmacognosy focuses on the study of the biology and biochemistry of naturally occurring drug products, such as herbs and those derived from plants and animals. Medicine Analysis is a subject about quality and quantity analysis of medicine components.

The inherent relationships of these disciplines is as follows:

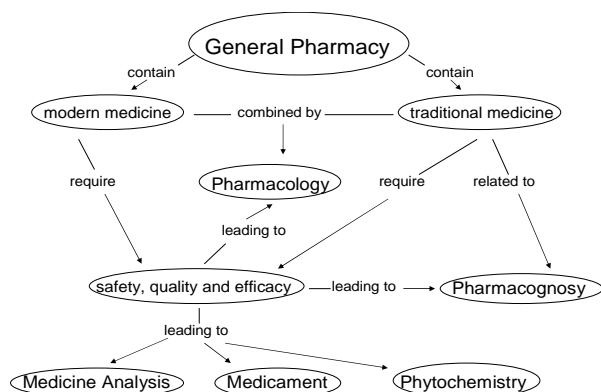


Figure 1. Relationship between Pharmacy and allied disciplines

General Pharmacy does not include clinical pharmacy, drug information and pharmacy administration, as these are more appropriate to the practicing pharmacist.

So the objective of this course is to provide a general education on traditional and modern medicine, to offer a pharmacy background for students in other fields.

Student-centred learning

In a student-centred learning model, teachers encourage students to take responsibility for their own learning, involve students directly in the discovery of knowledge, use materials that challenge students to use their prior knowledge to create new and deeper understandings of concepts, embrace the concept that learning is enhanced through social activities such as cooperative learning, problem-based learning (Panitz 2003). It is acknowledged that contributions to student learning come from faculty, students, staff, alumni, employers, family, and others and the activities beyond the classroom can be used to enhance the learning experience.

General Pharmacy is a curriculum deeply related to real life and is taken by large numbers of students. The students working in different areas bring ideas to the classroom in different ways and as such offer a good opportunity for student-centred learning.

Current program

With the current teaching approach students can often be passive and take a surface approach and use the study skills developed in a previous context where surface level processing of knowledge was sufficient and rewarded. A change from teacher-centred teaching to student-centred learning will help learners to be more in control of their own learning, generate intrinsic motivation rather than extrinsic and process subject matter in a more active and varied way.

Currently the course has 32 hours of lectures and 10 hours for a few practical sessions. At the end of a semester, students take a final examination which constitutes their final mark for the course.

The lectures are given to students in two hour blocks each time, with a ten minutes break in the middle. Students take notes and hand in assignments from each lecture session in the next class. They are allowed to ask questions in class or through email or write them into their homework. Usually the teachers give feedback on homework to each student individually or they explain the problems encountered by the class to all students at the next class.

A few practical sessions only are designed for these students. They work in small groups with three or four people who come from the same disciplines but from different years. After the practical class each student hands in a report which is marked later.

Currently each lecture usually starts by posing a question about a medicine, and then the content of the lecture follows the following sequence: origin; configuration; components; function; quality; application; and examples. This is the usual way to present the lecture content in the Pharmacy School and this is an example of problem-based teaching.

Student views about PBT

During last four years, 1200 students have been surveyed about the teaching strategies of *General Pharmacy*. The findings show that students have both good and poor comments to make on PBT.

- The course content is interesting and this content enables them to offer medical counseling to others. Even though the students may find the presentation boring, they still listen as the information is useful for their health. As teachers we want 'teaching intent' and 'learning outcomes' to be the same thing, but they rarely are.
- Students like to share ideas between groups of students from different disciplines. The special advantage of this curriculum is it offers the chance for students to share ideas with students from very different programs. They can discuss with each other, and many ideas become clear during this process. However, the students complain that they have not been given enough opportunity to do this. There is not enough time set

aside or activities to promote this type of communication with each other.

- Students feel some examples are more interesting than others. This suggests that real life problems will always be more interesting and motivating.
- Students indicate there is too much content and that they do not want to learn all the detail that would be in a specialist pharmacy course.
- The course is not sufficiently relevant to students' professional pathways. Currently only one or two staff give all the lectures in the course and students indicated that it is hard for them to study all the professional information, in the absence of relevance to their own field of study. They suggested that we should include other academic staff with a different style and background, but relevant to pharmacy, to join the teaching team.

Curriculum redesign

Investigations show that people retain 90% of what they say as they do something but only 10% of what they read and only 50% of what they hear (Lagowski 1990). In teaching it is more appropriate to include measures that help students learn.

Based on the student survey and student-centred learning theory, the author intends to add changes to the current approach in the following ways.

Increase staff with a more varied academic background

The teachers with different academic backgrounds give students a more variable learning experience including ways of thinking, working and research. This broader input will help students master the knowledge more easily. These staff can be pharmacy lecturers, research staff, pharmacists, doctors, lawyers and government officers whose job has a direct relevance to the study of pharmacy.

Give students more seminars

Students will get more chances to do group discussion in seminars. In our University, seminars usually are given to postgraduate students. Undergraduate students have little opportunity to be involved in seminars.

We will give students more seminars than before. Research staff and postgraduate students can be involved in these, especially in the discussions with undergraduate students.

Peer group activities

Organise peer group activities with the groups made up of students from different fields of study. Students will be encouraged to collaborate in these new peer groups. Such group work focuses mainly on the elements of interaction between students that is inherently motivating and encourages a range of learning activities. It often includes group base project work, peer tutoring and student led seminars. The skills developed from such activities within the classroom will be invaluable to the students in their future learning and career.

Use concept mapping

Concept maps are diagrams in which various forms or lists of information are classified and their linkages are shown. They can be used either in teaching or in learning.

For the teacher, concept mapping can be used:

- at the start of a topic or unit of work to help establish what the students' preconceptions are (right or wrong.);
- to help establish whether or not the students understand the concepts that link the various pieces of information together (linking concepts or ideas);
- to explain why teacher is focusing on a particular aspect of a topic (like drug dosage) so that the students can see how particular pieces of information fit into the overall schema; or
- as a key plan for the lecturer in working out the best way to teach a topic.

For the student, concept mapping can be used:

- to help students retain a mind map of the information they are studying and answer the question 'Why are we learning this?'; or
- by students constructing a map before a topic and one after the topic to help them know what it is they have learned and what it is they still do not understand. This can also be used as an assessment tool.

Example of the use of concept mapping:

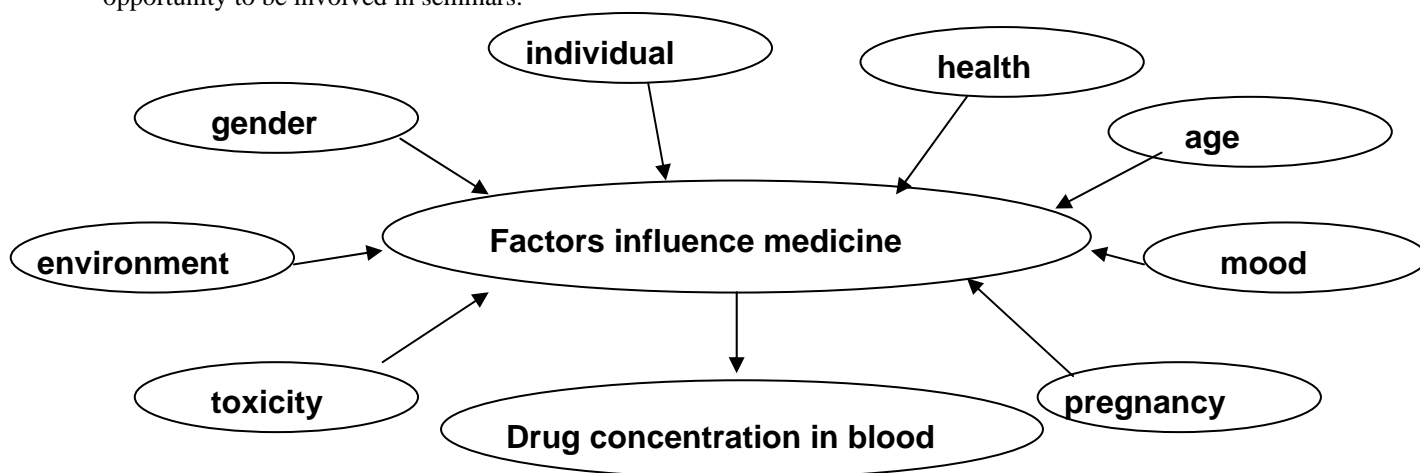


Figure 2. Concept map of drug concentration in blood

The concept of 'drug concentration in the blood' can be taught using concept mapping. At the start of the class, students can be asked to draw a map to include the factors that can influence the effect of a medicine. Students will include items based on their personal experiences or preconceptions, for example, age, gender, pregnancy. They can list many of these even without a professional background. Most students will not be able to go further; they may just stay at this level. Then the lecturer can provide more detailed maps shown in the Figure 2. It is an index to measure all the factors. With this schema in mind, students will make sense of the significance of the concept: to ensure safety, quality and efficacy of a medicine. In the next few lectures, the teacher may use problems related to this map, for example, how we can deal with a patient with various known clues like age or health.

Use of problem-based learning – group activities and workshop

PBL involves learning through tackling relevant problems. Concrete experience of real world tasks may encourage students, increasing motivation; make them more active in their own learning process, and more aware of their own existing knowledge base. PBL uses methods such as games, simulations, role-plays, site visits, practical work and actual real problem solving tasks.

What we will do in *General Pharmacy* is:

- divide students into small groups to tackle a problem, whilst the students may not be able to solve the problem, much learning can be done by engaging in the process; and
- set up a workgroup include several staff and some voluntary students who will work on the program of PBL. (The students will be invited from the Pharmacy and Medicine School, that is, students with a good knowledge of general pharmacy.)

Every member of the group will need to share a common understanding of what PBL is all about so that they can all discuss these ideas with their colleagues and others so that there is a greater understanding of this change in teaching within the University.

Other strategies for supporting student-centred learning

- Use of the Web for supporting learning activities in the classroom, e.g. multimedia and online resources to supporting student learning. In addition, we may borrow the idea of a virtual learning environment (VLE), from the School of Biological Sciences, University of Sydney (Peat 2000).

- Focus on scaffolding the outline of the discipline for students. This point is important not only for *General Pharmacy* but for many other courses. This will help learners build the schema of their discipline as soon as they begin to study it. This will be very helpful for their future learning, providing a mechanism to identify what they are learning and making the contents clear and logical.

Challenge and Prospect

In order to achieve the ideal outcome of this new plan, we have to seek the support of staff and students for a student-centred learning approach, and seek funds to implement appropriate changes. In our University, more than fifteen teachers are taking part in the program 'Teaching Science in English', and we could work together on the new program.

The outcome of these changes will be a better learning experience for the students. They can use the ideas in their future study and career. Some of them will become teachers; they will spread the idea to more people. We can modify our plan in time according to the feedback from our evaluations which we conduct in the middle of every semester.

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